

CLAIMS

We claim:

- 5 1. A device for improving hearing in a subject, comprising:
 - a) a transducer comprising a magnet and a coil disposed within and attached
to a housing, said magnet producing a first magnetic field and said coil
producing a second magnetic field, said first and second magnetic fields
interacting to cause vibrations of said housing,
 - 10 b) at least one electrode,
 - c) a receiver,
 - d) a means for conducting current between said receiver and said transducer,
and
 - e) a means for conducting current between said receiver and said at least one
15 electrode.
2. The device of Claim 1, wherein said transducer is a floating mass
transducer.
- 20 3. The device of Claim 1, wherein said transducer is configured for
attachment to a subject's temporal bone.
4. The device of Claim 1, wherein said transducer is configured for
attachment to a bone of a subject's ossicular chain.
- 25 5. The device of Claim 1, wherein said transducer is configured for
attachment to a subject's round window.
6. The device of Claim 1, wherein said at least one electrode is configured
30 for attachment to a subject's round window.

7. The device of Claim 1, wherein said at least one electrode is configured for attachment to an outer surface of a subject's round window.

8. The device of Claim 1, wherein said at least one electrode comprises a
5 microelectrode array configured for insertion within a subject's cochlea.

9. The device of Claim 1, wherein said receiver is configured for implantation within a subject's mastoid bone.

10. The device of Claim 1, further comprising an audio processor comprising:
10 a microphone, a circuit, a battery, and a coil, disposed within and attached to a housing.

11. A device for improving hearing in a subject, comprising: a microphone, a
battery, electronics, at least one electrical transducer suitable for transmission of an
15 electric signal to a structure of a subject's inner ear, and at least one mechanical
transducer suitable for transmission of a mechanical signal to a structure of a subject's
middle ear.

12. The device of Claim 11, wherein said microphone is disposed within and
20 attached to a microphone housing and wherein leads extend from said microphone to a
position outside said microphone housing.

13. The device of Claim 11, wherein said microphone is selected from the
group consisting of an omnidirectional microphone and a bidirectional microphone.

14. The device of Claim 11, wherein a protective cover is attached to said
25 microphone.

15. The device of Claim 11, further comprising an amplifier.

30

16. The device of Claim 11, wherein said battery is disposed within and attached to a battery housing and wherein leads extend from said battery to a position outside of said battery housing.

5 17. The device of Claim 11, further comprising a means to signal low charge state of said battery.

18. The device of Claim 11, further comprising an external charge unit comprising a battery status indicator for detecting the charge state of said battery.
10

19. The device of Claim 11, wherein said electronics are disposed within and attached to an electronics housing.

20. The device of Claim 11, wherein said electronics comprise a telemetry
15 block and a communications block.

21. The device of Claim 20, wherein said telemetry block is selected from the group consisting of a bidirectional telemetry block and a unidirectional telemetry block.

20 22. The device of Claim 20, wherein said telemetry block and said communications block comprise a dual coil.

23. The device of Claim 20, wherein said telemetry block and said communications block comprise at least two resonant coils.
25

24. The device of Claim 23, further comprising a magnet to facilitate alignment of said at least two resonant coils.

25. The device of Claim 23, wherein an alternating current signal is
30 transmitted between said at least two resonant coils.

26. The device of Claim 23, wherein an amplitude modulated signal is transmitted between said at least two resonant coils.

27. The device of Claim 23, wherein a base band signal is transmitted between
5 said at least two resonant coils.

28. The device of Claim 23, wherein an alternating current signal in the audio frequency band is transmitted between said at least two resonant coils.

10 29. The device of Claim 23, wherein an alternating current signal above 20,000 hertz is transmitted between said at least two resonant coils.

30. The device of Claim 11, wherein said microphone, said power supply, and said electronics, are attached to and disposed within a combined housing, and wherein
15 said at least one electrical transducer and said at least one mechanical transducer are located external to said combined housing.

31. The device of Claim 30, wherein said combined housing is selected from the group consisting of a ceramic housing and a titanium housing.

20

32. The device of Claim 30, wherein said combined housing is suitable for surgical implantation in a subject's mastoid bone.

33. The device of Claim 11, wherein said mechanical transducer has a
25 resonant frequency between 250 and 10,000 hertz.